5. HABITAT ASSESSMENT FOR WATERBIRDS IN THE UMVGL REGION

5.a Habitat types and quantity needed by waterbirds

Waterbirds are a diverse group that varies in its sociality when nesting, feeding, and roosting. Colonial waterbirds are characterized by strong aggregatory behavior, particularly when nesting and roosting. Some species form large colonies and roost sites with many thousands of individuals, making these birds highly conspicuous throughout the year. Selection of breeding and foraging sites is strongly influenced by their colonial nature. Most colonial waterbirds appear to minimize predation and competition by nesting on remote islands or isolated peninsulas, but close to good sources of prey. In general, fish comprise a substantial portion of the diet of colonial waterbirds that occur in the region, and a diverse variety of aquatic communities are used for foraging. Conversely, many non-colonial waterbird species are characterized by a secretive and solitary nature (i.e., bitterns, rails). They are among the most inconspicuous of birds, and accomplish important activities such as foraging and reproduction largely through stealth and hiding. Habitat selection by these species is closely tied to their cryptic behavior. Marshes and wet meadows dominated by stands of emergent vegetation are typically selected for nesting and foraging, as they provide good cover for hiding.

Based on their use of specific wetland types, islands, and vegetation characteristics during the breeding season, waterbirds can be classified into various habitat guilds (Beyersbergen et al., 2004; Ivey and Herziger 2005). Table 5.1 presents regularly occurring waterbird species in the UMVGL Region in five habitat guilds based on community types important for waterbirds (some species occur in multiple community types). Several species of waterfowl and shorebirds use the same areas and are included in the table to demonstrate overlap in habitat needs by groups of birds, and how bird species in other groups might serve as

indicators for waterbird species (see Section 5.c). More specific information on waterbird habitat requirements is given for each species in the species profiles in Appendix A.

Information on the quantity of habitat required by most waterbird species is not well documented. Additionally, the quantity of habitat required by a species varies with the quality of the habitat; also feeding and social requirements, and thus habitat needs, change throughout the year. When available, documented density estimates are included in the species profiles (Appendix A) as an indicator of the number of individuals a particular habitat type is known to support. Using this type of information and data on specific site attributes required by each species, habitat management objectives can be developed to support targeted numbers of birds (i.e., population goals). Habitat objectives can be adjusted and refined as our understanding of waterbird needs improves through ongoing and new research and modeling.

5.b Habitat availability in the UMVGL Region

Natural and managed wetlands and open-water sites throughout the Region are used by waterbirds to meet breeding and foraging requirements. They include marshes, ponds, creeks, streams, sloughs, lake shorelines, islands, shoals, river floodplains (especially along the Mississippi, Illinois, Missouri, and Ohio Rivers), and reservoirs. Following is a description of major areas within the Region that provide important waterbird habitat. There are no Canadian rivers of comparable size which provide habitat for waterbirds.

The Great Lake Islands. The Great Lakes system provides much of the key nesting and foraging habitat in the region. Though waterbirds use a variety of settings throughout the basin, natural islands and wetlands, especially marshes, are the most important and commonly used. Within the Great Lakes, there are about 30,000 islands that range in size from small boulders to >100,000 acres (Crispin 1999). While nesting habitat quality of some islands in the Great Lakes

has declined through human use and activity, islands throughout the basin are relatively intact. They constitute a unique natural resource, forming the world's largest freshwater island system, and provide habitat for millions of nesting colonial waterbirds annually (Cuthbert et al. 2003; Weseloh et al. 2003). On Lake Ontario alone, nearly 1,000,000 waterbirds, including breeding birds, young-of-the-year, and non-breeding adult birds, were estimated to occur 1997-1999 (Weseloh et al. 2003). Over the past three decades, the USFWS and CWS have conducted a decadal census effort for colonial waterbirds nesting in the Great Lakes. This thirty-year effort documented a total of 2,211 individual sites used by colonial nesters in U.S. and Canadian waters (Figure 5.1); most of these sites were islands (Cuthbert et al. 2003; Weseloh et al. 2003). Abundance and distribution information collected during these census efforts has been the basis for much of the conservation planning for colonial waterbirds in this area. Precise estimates on number of acres of habitat available within the region for particular species are not available, and thus, to date, conservation of colonial waterbirds has been focused on specific sites.

In U.S. waters, the six most common colonial waterbird species regularly nest on islands, often in significant numbers. They include Double-crested Cormorant, Great Blue Heron, Black-crowned Night-Heron, Ring-billed and Herring Gulls, and Common Tern. Less common colonial nesters that typically use islands include Caspian Tern and Great, Snowy, and Cattle Egret. Since 1994 the American White Pelican has expanded its range and currently nests at a limited number of islands in the U.S. Great Lakes (Cuthbert et al. 2003). Occasional nesting by the Little Blue Heron, and Glossy Ibis has also been documented within the U.S. waters (Cuthbert et al. 2003). The Great Black-backed Gull first nested in the U.S. Great Lakes in 1981 at Little Galloo Island in New York (Blokpoel and Weseloh 1982, Weseloh 1984); at the time of

the last survey (1997-99) it nested at 13 sites (Cuthbert et al. 2003). Little Gulls nested in Green Bay during the 1970s but have not nested in U.S. waters since this time (Cuthbert et al. 2003).

In Canadian waters, nesting habitat for Herring and Ring-billed Gulls and cormorants is widely available, though islands are mostly lacking along most of the central basin of Lake Erie and the southeast shore of Lake Huron. Common and Caspian Terns nest on a single island in eastern Lake Erie, at artificial sites in the western half of Lake Ontario, and on natural sites in eastern Georgian Bay and the North Channel (Lake Huron). Great Blue Heron, Black-crowned Night-Heron and Great Egret are well distributed in western Lake Erie and on single islands on the west shore at the base of the Bruce Peninsula and on the south end of Georgian Bay in Lake Huron. Great Blue Heron colonies are also found in the North Channel and along the Lake Superior shore. Great Black-backed Gull first nested in the Canadian Great Lakes in 1954 at Little Haystack Island in Lake Huron proper (Krug 1956) and has slowly increased in Canadian waters especially in eastern Lake Ontario (Weseloh 1984, Pekarik 2004). Cattle Egret has occasionally nested, but not in the last twenty years (D.V. Weseloh, pers. comm.). Little Gull nested at various locations from 1962 to 1989, but have not nested since this time (Weseloh 1987, 1994 and Ewins and Weseloh 1999; D.V. Weseloh, pers. comm.).

The number and quality of islands suitable for colonial nesting waterbirds varies throughout and among the lakes and connecting waterways. In U.S. waters, with the exception of Lake St. Clair and southern Lake Michigan, nesting habitat for gulls is widely available. Much important habitat for Caspian Terns, Double-crested Cormorants, Great Blue Herons and Black-crowned Night-Herons is found on islands in northern Lake Michigan (including Green Bay) and western Lake Huron. Habitat for nesting cormorants can be found throughout the region, with the exception of Lake St. Clair, and southern Lake Michigan. Islands in western

Lake Erie, some smaller water bodies (e.g. lakes Champlain and Winnebago), and in the St. Lawrence River provide habitat for large concentrations of Great Blue Herons and Black-crowned Night-Herons. The largest Great Blue Heron colony in western Lake Superior occurs near the coast in a remote location on the Bad River Indian Reservation east of Ashland, Wisconsin (S. Matteson, pers. comm.). Although Common Terns occur throughout the region, natural nesting habitat is limited; artificial sites (e.g., navigational aids, piers, pier "remnants") in the St. Lawrence and Niagara rivers, western Lake Superior, Lake St. Clair, western Lake Ontario and eastern Lake Erie provide much of the habitat currently used by this species. For egrets, most habitat is currently limited to western Lake Erie and LakeHuron, particularly along the Saginaw Bay, and off the west side of the Bruce Peninsula and southern Georgian Bay.. Many island nesting species use near-shore areas for foraging.

Great Lake Coastal Marshes. Several non-colonial species also use the Great Lakes region for nesting and foraging, including Green Heron, Pied-billed Grebe, Virginia Rail, King Rail, Common Moorhen, American Coot, Sora, American and Least Bittern and Sandhill Crane. These species nest and forage in the coastal marshes of the Great Lakes, along with two colonial species, Forster's and Black Terns. Numbers of non-colonial species using the Great Lakes are not available, but marshes in the region are known to provide important nesting and foraging habitat (Maynard and Wilcox 1997; Timmermans and Craigie 2002).

Unlinke island habitats, much of the shallow marsh and wet meadow community has been lost or degraded since European settlement (see Chapter 4). About 300,000 acres of coastal wetlands remain around the U.S. Great Lakes (Herdendorf et al. 1981), but coastal wetland area and site characteristics are dynamic, changing with long-term water level fluctuation (Keddy and Reznicek 1986). Comparable Canadian data do not exist for all the lakes, but approximately

62,000 acres (25,000 ha) of shoreline wetlands were estimated on Lake Ontario (Dodge and Kavetsky 1995). The most extensive coastal marshes remaining around the Great Lakes are associated with bays, deltas, and "drowned river mouths", wetlands that occur immediately inland from the lakeshore. Large wetland complexes remain intact in several locations along the U.S. and Canadian Great Lakes shoreline. Area estimates for the 15 largest complexes total as much as 280,000 acres (112,000 ha), with the following proportional distribution: Lake Huron 26%, Michigan 25%, Erie 18%, St. Clair 17%, Superior 7%, and Ontario 6% (Prince et al. 1992). Locations and attributes of larger coastal wetlands associated with each of the Great Lakes and important for waterbirds are summarized below.

Lake Superior wetlands. Along the north shore of Lake Superior, wetlands are rare and restricted to the large sheltered embayments of Goulais Bay and Batchawana Bay in the northeast, and Thunder Bay, Black Bay and Nipigon Bay in the northwest. Wetlands along the southern shore are larger and more numerous. The largest is the Kakagon Sloughs/Bad River complex east of Ashland, Wisconsin, which provides significant foraging habitat for waterbirds (gulls, terns, herons) and breeding habitat for rails, and the same for waterfowl (S. Matteson, pers. comm.). The St. Louis River estuary of western Lake Superior is another important wetland complex for waterbirds and waterfowl, especially during migration. The Whittlesey Creek National Wildlife Refuge and Fish Creek Sloughs in Chequamegon Bay, as well as Portage Entry Marsh in Keweenaw Bay, are also relatively large and provide significant habitat for waterbirds, shorebirds and waterfowl. The Sturgeon River Sloughs near Arnheim, Michigan, are also significant and provide important habitat for American Bittern, Sora, Virginia Rail and staging Sandhill Crane in the fall (R. Russell, pers. comm.).

Along the north shore of Lake Superior large-scale wetland losses have not occurred due to the shoreline's remote and sparsely populated character, and outside the city of Thunder Bay, wetlands have not suffered significant loss. Water control structures at Sault Ste. Marie may have some influence on lake level and Lake Superior's coastal wetlands (Maynard and Wilcox 1997). However, the vast watershed for this lake is largely covered with native plant communities and the system remains relatively free of human influence.

Lake Michigan wetlands: Along the shores of Lake Michigan, wetlands covering almost 49,000 ha have been identified; the greatest concentrations are along the rivers emptying into the lake along the western shore, in Green Bay, and smaller bays in the northern part of the lake. The most extensive coastal wetlands in this area include Big and Little Bay de Noc and the Sturgeon River Wetland. In addition, from northern Indiana and continuing northeasterly along the coast of Michigan's Lower Peninsula, massive coastal dunes dominate the shore and there are no littoral marshes on the lake side of the shoreline. However, inland from the lakeshore are some of the lake's most common wetlands: the embayed, barrier beach and riverine systems, or drowned river mouths. The largest river marshes include Oconto, Manistee, Pere Marquette, Muskegon, Pentwater, and Peshtigo.

Some of the best examples of Great Lakes marshes can be found in Lake Michigan and in Georgian Bay. In the relatively less populated northern portion of Lake Michigan, northern Green Bay and along the eastern side of Door Peninsula, many wetlands remain intact, but in the more densely populated and urban areas wetlands have been lost and or deteriorated. Additionally, wetlands in the Green Bay area have also experienced severe loss, degradation, and reduced water quality. Nevertheless, a great variety of birdlife, including colonial and non-colonial waterbirds, use these coastal wetlands for breeding, foraging and resting (Maynard and

Wilcox 1997; Cuthbert et al. 2003). In southeastern Georgian Bay at the Matchedash Bay wetland complex, the marshes of Matchedash Bay are the largest and most diverse along the Georgian Bay shoreline. The Matchedash Bay wetland complex constitutes an Important Bird Area and is recognized as a Ramsar site, a wetland of international significance and importance. The southern half of the IBA contains extensive marshlands at the confluence of the Coldwater and North Rivers, while the northern half encompasses the marshes and open water of Matchedash Bay. This IBA site provides habitat for several priority waterbird species, including large numbers of Least Bittern; it is also significant for Black Terns and other marshbirds, and summer records suggest King Rail may breed here. Sedimentation, invasive exotics, and habitat degradation in the surrounding landscape threaten the integrity of marshbird habitat in this area (Wilson and Cheskey 2001).

Lake Huron wetlands. Accounting for over one forth of Lake Huron's surface area, Georgian Bay is the largest and most diverse of the bays on the Great Lakes. About 12,600 ha (31,122 acres) of coastal wetlands are estimated to occur around the edge of this bay alone. Wetlands along much of the Canadian shore of the lake are in sheltered embayments and creek mouths and in the lee of large islands, particularly along the western shore of Bruce Peninsula, southern Manitoulin Island, and northern Georgian Bay. The eastern shore of Bruce Peninsula in Georgian Bay is rugged and extensive wetlands do not develop. Loss of wetlands on a large scale has not occurred because most of the northern shoreline is sparsely populated and remote; most losses concentrate around the small urban centers on the shore. However, more than half the wetlands along the central Canadian Lake Huron coast, the western coast of Bruce Peninsula and southern Georgian Bay have suffered losses of acreage.

The most extensive coastal wetlands on the U.S. side of Lake Huron occur along the St. Marys River in Michigan's eastern Upper Peninsula and around the Saginaw Bay. Deep and shallow water herbaceous wetlands, scrub-shrub, and swamp occur in broad stretches along Munuscong Lake and Sugar and Neebish Islands on the St. Marys River. Wetlands of the Saginaw Bay are most common on the west and southeast shores, including Wigwam Bay, Nayanquing Point, Tobico Marsh, Wildfowl Bay, and Fish Point. Numerous smaller coastal wetlands associated with bays and spits are also found along the Michigan shoreline north of Saginaw Bay and south of the St, Marys River. Whereas wetlands located on the north U.S. coast of the lake have had relatively little human influence, most of the Saginaw Bay sites have had significant negative pressures, especially from agriculture and lakefront development. Lake Huron's wetlands and the marshes of Georgian and Saginaw Bays provide significant breeding, feeding and migration areas for many colonial and non-colonial waterbirds and very large numbers of dabbling ducks (Maynard and Wilcox 1997; Cuthbert et al. 2003; Ewins 1994)..

Lake Erie wetlands. Wetlands of Lake Erie are predominantly lagoon, embayed and drowned river mouth emergent marshes. A large number of coastal wetlands surround the shorelines and estuaries of western Lake Erie in Michigan and Ohio. Along the lake's north shore in Ontario fewer but more extensive wetlands occur behind large sand spits; in total 31 wetlands covering nearly 18,900 ha (46,683 acres) occur (Maynard and Wilcox 1997). In the western basin of the lake, the largest marshes are at Point Pelee, Cedar Creek and Hillman Creek. In the central basin, the largest marshes are in Rondeau Bay and Big Creek. In the central/eastern basin, the most important wetlands are the wetlands protected by Long Point, which encompass 13,465 ha (33,259 acres) and include >70% of the total wetland area along the north shore of Lake Erie. Along the U.S. shoreline there are 87 wetlands encompassing more

than 7,900 ha (19,513 acres) (Maynard and Wilcox 1997). The shallow western basin from the mouth of the Detroit River to Sandusky Bay, Ohio has the largest concentration of marshes. The largest coastal wetlands of western Lake Erie are Point Mouillee Marsh, the Maumee Bay wetland complex, wetland complexes flanking Locust Point and wetlands in Sandusky Bay. The largest wetland along the U.S. shore of the central basin is a primarily forested wetland at Mentor Marsh. In the eastern basin, with the exception of Presque Isle, the U.S. shoreline consists mainly of bluffs.

Along the U.S. shore, most of the coastal wetlands have been lost due to agriculture and development, especially in the western basin. Along the Canadian shore losses have occurred mainly in the vicinity of the large sand spits such as Point Pelee. The remaining coastal wetlands of Lake Erie may support the largest diversity of wildlife species in the Great Lakes. Waterbirds, shorebirds, waterfowl and raptors all use these wetlands and shorelines extensively for migration, nesting and feeding. Some of the most important waterfowl complexes for spring and fall staging in the Great Lakes occur in the wetlands and shallow waters of western Lake Erie, particularly around Long Point (Prince et al. 1992). The swampy woodlands associated with the marshes are used by relatively uncommon waterbirds in the Great Lakes (e.g., Least Bittern, Great Egret, Black-crowned Night-Heron), and rare species such as King Rail, Little Gull, Forster's and Black terns nest or have nested in Lake Erie wetlands (Maynard and Wilcox 1997).

Lake Ontario wetlands. Along the shores of Lake Ontario, 225 wetlands covering 17,000 ha (41,990 acres) have been identified (Maynard and Wilcox 1997). Wetlands are most abundant in the eastern portions of the lake, and are typically emergent and submergent marshes. The largest wetland in western Lake Ontario is Coote Paradise in Hamilton. The shoreline from Presqu'ile Point to the mouth of the St. Lawrence River contains 85% of the wetland area along

the Canadian shore. Along the north and east side of the Prince Edward County, extensive marshes have developed in the Bay of Quinte, including Sawguin Creek, Hay Bay Marsh, Big Island Marsh, Big Marsh, Dead Creek Marsh and Pleasant Bay Marsh. In the U.S., a total of 168 wetlands covering 5,500 ha (13,585 acres) is present. The shoreline between Rochester and Stony Point contains 70% of the wetland area along the U.S. shore.

Lake Ontario wetlands have experienced severe loss over the last two centuries. Along the Canadian shore west of the Bay of Quinte, and from Toronto to the Niagara River, 43% and 73 – 100%, respectively, of the original marsh area has been lost. Along the U.S. shore, losses are estimated at near 60% and most are associated with the heavily populated areas surrounding Oswego and Rochester. In addition to use by waterfowl and raptors, Lake Ontario's wetlands provide important habitat for several waterbird species, including American and Least bitterns and sometimes Black Tern (Maynard and Wilcox 1997; Cuthbert et al. 2003).

Other Great Lakes wetlands. The wetlands of the St. Clair, Detroit, Niagara and St. Lawrence rivers, and Lake St. Clair provide important waterbird breeding, foraging and migration habitat. Marshes and adjacent wet prairies around Walpole, Harsens, and Dickinson Islands on Lake St. Clair have supported large numbers of marsh-nesting terns and large colonies of Great Blue Herons and Black-crowned Night-Herons. Some of the wetlands of the St. Lawrence River support Black Terns. Status and complete descriptions of these wetlands are available (Maynard and Wilcox 1997).

Importance of water level fluctuation to wetland diversity. A key process critical to the health and diversity of Great Lakes coastal marshes is naturally fluctuating water levels. Typically water levels vary 25-40 cm (10-15 in) during the year due to seasonal precipitation and evaporation, with levels the lowest in late fall-early winter and highest in late spring-early

summer (GLIN 2005). Longer-term changes in water level associated with extended precipitation patterns are also important, and differences of up to 2 m between all-time high and low water levels have been recorded in the Great Lakes (Bedford 1992). Average annual water levels regularly vary about 1 m during 15-20 year cycles (NOAA 1992). These natural fluctuations (both seasonal and long-term) in water level "stress" coastal wetlands but are vital in maintaining diversity. During the high-water portion of the cycle, brush and emergent herbaceous vegetation intolerant of deeper water die off or become uprooted by waves and ice action. At the same time emergents are declining at a site, submerged aquatic communities typically become established and expand landward. Likewise, stands of emergent plants move landward into the newly inundated shallow areas, while sedges and grasses establish new wet meadows further inland. Conversely, during periods of declining and low water, emergents, wet meadow species, and ultimately woody plants expand lakeward to recolonize areas as aquatic communities establish themselves further outward into the lakes.

This lateral displacement of plant communities can occur surprisingly fast in deltaic systems that have the added influence of accelerated sediment deposition (Soulliere 1995). Ultimate plant community composition during a given year may depend on several factors in addition to degree of water level change (e.g., seed bank, timing of mudflat exposure and germination conditions, surrounding plant communities), resulting in relatively high (albeit dynamic) annual plant and wildlife diversity. Under more stable water levels (e.g., stabilized due to water-level control or impoundment), coastal wetlands occupy narrower zones and have considerably less diverse communities (Prince et al. 1992). Dominant species, such as cattail, ultimately outcompete many other wetland plant species under a stable water regime. This is

characteristic of many of the coastal wetlands of Lake Ontario where water levels are regulated (State of the Great Lakes 2003).

Great Lakes deep-water habitat. In the fall of 2003, Langen et al. (2005) undertook a pelagic bird survey on Lake Ontario. This survey indicated that significant numbers of migrant pelagic waterbirds forage in the far offshore region of Lake Ontario, well beyond the zone visible from shore. Waterbird species included Common Loon, Horned Grebe, Double-crested Cormorant, Ring-billed, Herring, Bonaparte's and Great Black-backed Gull Gulls, and Common and Black Terns. Offshore waters appeared especially important for Common Loon, as this species was more abundant on Lake Ontario than on Common Loon marine wintering sites off the southeastern United States. Langen et al. (2003) conducted a literature review and failed to locate any published papers that directly estimate the abundance and dispersion of pelagic waterbirds in the far offshore region (>10km from the mainland or islands) of any Laurentian Great Lake. The use of Great Lakes deep-waters / far offshore regions by migrating waterbirds needs further study and is an information gap.

"Big Rivers" and other inland habitat. Unlike the north half of the UMVGL region, with its Great Lakes and almost innumerable inland lakes and wetland basins, the southern half of the region has relatively few natural lakes. Water and wetlands are largely found in river systems – the river channel and its associated bottomland lakes and floodplain. The "big rivers" (i.e. Mississippi, Illinois, Ohio and Missouri) provide much of the waterbird nesting, roosting and foraging habitat in this portion of the region. The condition and habitat associated with each of the major rivers is described below.

Mississippi River and associated wetlands. Despite the modifications this system has undergone, the Mississippi River still supports a diverse array of wetland, open-water, and

floodplain communities year round and remains a key conservation corridor for the region's waterbirds. The largest river in North America in terms of water volume and the second longest river in the U.S. (2,340 miles), it is a major river system in size and bird habitat diversity, and includes the largest continuous system of wetlands on the continent. From its source at Lake Itasca, Minnesota, it flows south through the mid-continent United States, the Gulf of Mexico Coastal Plain, to its subtropical Louisiana Delta. Its north-south orientation and nearly contiguous availability of bird habitat result in the river being used by millions of birds each year during fall and spring migration. Pelicans and cormorants, along with diving ducks and swans, use the river's large open-water pools. The shallow backwater riverine wetlands are used by herons, egrets, Black Terns, bitterns, and rails, along with dabbling ducks, geese and songbirds. Bottomland forests support migrant and nesting populations of herons and egrets in addition to songbirds, Bald Eagles, Ospreys, Hooded Mergansers, Mallards, and Wood Ducks.

In the UMVGL region, extensive tracts of high quality waterbird habitat are associated with the Upper Mississippi River System (UMRS), and have been protected in multiple National Wildlife Refuges (NWRs) (Appendix B). As wetlands and forests have been lost and degraded, and urban and agricultural areas have expanded, the importance of these permanently protected natural and restored areas has increased. The lands and waters of the Upper Mississippi River National Wildlife and Fish Refuge Complex contain important habitat areas along the upper half of the UMRS, while the Mark Twain NWR Complex encompasses valuable waterbird habitat along the lower half of the UMRS. In these two refuge complexes, >300,000 acres of wooded islands, water, and wetlands occur along the river corridor (Appendix B).

Ohio River and associated wetlands. Like the Mississippi, the Ohio River has undergone substantial modifications resulting in fragmentation and loss of wetlands. Nevertheless, several

high quality natural areas still occur in the Ohio River Valley (Wiggins et al. 2002). The river begins at the confluence of the Allegheny and Monongahela rivers at "the Point" in Pittsburgh, PA, and flows 981 miles in a southwesterly direction to join the Mississippi at Cairo, IL. Community types especially important to birds include bottomland hardwood floodplains, wetlands, islands, sandbars, pools and rich riparian zones adjacent to the river's edge. A total of 40 islands remains in the Upper Ohio River, and many of these are encompassed in the Ohio River Islands National Wildlife Refuge. The Big Oaks NWR, IN and Clark's River NWR, KY, near the southwestern portion of the river (Appendix B), also maintain areas with waterbird values.

Illinois River and associated wetlands. Though significant changes have greatly reduced areas suitable for waterbirds, this Illinois River continues to retain important aquatic communities and value to migratory birds. The river begins at the confluence of the Des Plaines and Kankakee rivers near Chicago, IL, and flows southwest 237 miles to the Mississippi River at Grafton, IL. (Midwest Natural Resources Group, 2001; http://www.mnrg.gov/illinois.htm). The river and adjoining backwaters provide an aquatic resource of about 87,000 surface acres (35,223 ha). Cover types include mixed bottomland hardwood forests, swamps, marshes, seasonal and permanent wetlands, shallow floodplain, and deltas. The system also includes many backwater lakes that are connected to the river, some only during high flow periods. These areas have historically received high use by wetland-dependent birds, but most are severely degraded due to river-associated sedimentation. The Illinois River National Wildlife and Fish Refuges Complex encompasses and protects significant areas of natural community on the river and it is important for multiple waterbird species (Appendix B).

Missouri River and associated wetlands. (Summarized from http://www.northern.edu/natsource/HABITATS/Missio1.htm; and http://www.fws.gov/midwest/ecosys/lowmiss.htm.) At 2,540 miles, the Missouri is the longest river in the U.S. From its headwaters at the confluence of the Gallatin, Madison, and Jefferson Rivers in the Rocky Mountains at Three Forks, MT, it flows generally south and east, to its confluence with the Mississippi River at St. Louis, MO. Though the river has been heavily modified and much associated waterbird habitat has been lost (see Chapter 4), its original community types are still represented and include sand dunes, cattail marshes, lakes, cottonwood-willow stands, cottonwood-dogwood stands, and elm/oak woodlands. Additionally, the creation of deep-water reservoirs has resulted in the development of extensive wetlands in the headwaters that provide high quality habitat for waterfowl and waterbirds. The Missouri River may constitute another major migration corridor, as it is used by millions of birds during fall and spring staging. Several refuges encompass portions of the river valley and will eventually restore some waterbird habitat, including the Big Muddy NWR (which consists of small tracts of land along the river from Kansas City to St. Louis, where the river will be allowed to function naturally), and the DeSoto, Boyer Chute and Squaw Creek NWRs (Appendix B).

5.c Habitat protection, restoration, and management objectives

At this time, there are significant obstacles to development of BCR-level habitat conservation objectives in the UMVGL Region, although site-specific objectives for many waterbird species are possible and in several cases implemented at area/local scales. These obstacles include lack of quantitative information on habitat and landscape requirements, habitat availability, and other habitat/landscape data, especially as data collected and organized at the

BCR scale. Meaningful habitat objectives must be linked to population objectives that are based on a desired population change for each species. To accomplish this, current population estimates, population goals, and a greater understanding of species habitat relationships are needed. Habitat objectives must be determined from the "population deficit," which is the difference between current population size and the population goal. Information about waterbird habitat quality also needs to be integrated into the habitat objective-setting process. Ultimately we need to identify the type, location and quantity of new habitat needed must be identified. Development of statistical models of waterbird habitat and landscape relationships, integrated with land cover data in Geographic Information Systems, can provide spatially explicit information on potential habitat for waterbirds (Naugle et al. 2001, Beyersbergen et al. 2004). The Upper Mississippi River and Great Lakes Joint Venture Office is building capacity to apply these tools to all-bird conservation, and this should be very useful in identifying focus areas for waterbird habitat conservation in the future.

As a first step, waterbird habitat availability within the UMVGL Region was assessed by summarizing habitat available in NWRs (Appendix B), Important Bird Areas (IBAs), and other signifcant sites (Chapter 6). To be complete, this preliminary summary needs to incorporate description of habitat available in National Wildlife Areas. Beyond this descriptive summary, however, a more complete landscape assessment must be undertaken for the Region. An assessment of habitat set aside and managed for waterbirds under public ownership and by nongovernmental organizations is needed, and a complete inventory of all existing wetlands and other landscape cover types important to waterbirds within the Region should be conducted. The utility of using National Wetlands Inventory data in the U.S. should be investigated in order to guide any expansions and refinements. As previously stated (Chapter 3), better information on

the population status of most waterbirds (especially non-colonials) is needed to improve the objective-setting process. Habitat objectives should be established both for breeding species and species that use the Region during migration. Similar to an approach used in the North American Waterfowl Management Plan waterbird migration habitat goals may need to be established in "use days" and then converted to habitat area measurements needed to accommodate the desired level of use days. Considering the number and diversity of species and the current lack of quantitative information on many of those species, it has been recommended that bird conservation planners use a "focal species" or guild approach (Ivey and Herziger 2005) combined with efforts focused on priority sites.

The guild approach and adopting waterfowl habitat objectives. The guild approach is valuable in developing bird habitat objectives because it helps identify habitat conservation actions that may benefit multiple waterbird species and other wetland-associated birds (Ivey and Herziger 2005). In the UMVGL region, habitat objectives have been established or are being established for waterfowl through the four regional Joint Ventures (JVs) that overlap our planning area. These JVs include the Upper Mississippi River and Great Lakes (UMRGL), Atlantic Coast, Central Hardwoods and Canadian Eastern Habitat JVs. Waterfowl conservation work will potentially benefit waterbirds because of the overlap in area used by wetland bird groups (Table 5.1).

Though not all waterfowl habitat will be beneficial for waterbirds, much of it will be. Management practices, especially water level manipulations, will determine the degree to which managed waterfowl areas will benefit waterbirds. Many waterfowl focus areas (resource-rich areas that provide maximum opportunities for waterfowl conservation) described in the

UMRGL-JV Waterfowl Management Implementation Plan (1998) are known to be important for many waterbird species (e.g., Black-Crown Marsh, northeastern IL focus area, provides habitat for Black Tern, Sandhill Crane, Common Moorhen, American Bittern, Great Egret, Pied-billed grebe and Black-crowned Night-Heron). Therefore, it is recommended that the waterfowl habitat objectives be adopted as objectives for waterbirds in the UMVGL until more specific waterbird habitat objectives can be developed. This approach was also taken in the UMVGL Shorebird Conservation Plan (de Szalay et al. 2000). Fortunately, most Joint Ventures have recently expanded their conservation efforts to all-bird groups, and waterbird habitat objectives will be a focus of the next UMRGL JV implementation plan (Soulliere 2005).

The individual site / area approach. In addition to use of waterfowl habitat objectives, it is recommended that waterbird habitat conservation include a site or area approach. Individual sites and specific areas are used regularly by specific waterbird species and aggregations of species. Though limited, information on important sites and areas is available at different scales and for various groups of waterbirds. For colonial waterbirds, identification of important sites has been underway for several decades thanks to monitoring efforts such as the Bi-national Great Lakes Colonial Waterbird Decadal Census, and state and provincial programs to monitor waterbirds. Additionally, because colonial waterbirds aggregate in dense numbers at specific sites and are conspicuous, identification of discrete, important sites is relatively straightforward. Identification of important areas for non-colonial waterbirds is more challenging because most of these species nest in low densities, are spread out over a landscape, and often use wetlands that are more variable than those used by many colonial species (i.e., islands in a lake vs. semi-permanent fresh water marshes). Appendix B includes information on NWRs and Chapter 6 on globally and continentally significant IBAs, and some sites of regional importance (e.g., sites

identified as high priority for nesting colonial waterbirds in the Great Lakes by Wires and Cuthbert (2001). This partial assessment of important sites and areas for waterbirds is a recommended starting place for conservation, recognizing that additional work needs to be undertaken to more completely identify regionally important sites and areas, especially for non-colonial species. Ultimately, site- and area-specific habitat objectives should be defined relative to waterbird priorities and population objectives, and combined at the BCR level.

Table 5.1. Five habitat guilds by general vegetative community type for waterbird, waterfowl, and shorebird species regularly occurring during the breeding season in the UMVGL Region.

SEASONAL WETLANDS AND WET MEADOWS (OPEN HERBACEOUS AND MUDFLAT SETTINGS)	**SHALLOW SEMI-PERMANENT MARSHES, HEMI-MARSH (EMERGENT VEGETATION AND OPEN WATER MIX ~ 50:50)**	**DEEP-WATER MARSHES AND OPEN WATER, ISLANDS WITH HERBACEOUS OR BRUSH VEGETATION**	**HERBACEOUS WETLANDS WITH ASSOCIATED FOREST / FORESTED ISLANDS, RIPARIAN AREAS**	**UNVEGETATED ISLANDS WITH ASSOCIATED OPEN WATER**
Yellow Rail	American Bittern	Common Loon	Great Egret	Double-crested Cormorant
Black Rail	Least Bittern	Double-crested Cormorant	Double-crested Cormorant	American White Pelican
King Rail	Red-necked Grebe	American Coot	Great Blue Heron	Caspian Tern
Virginia Rail	King Rail	Red-necked Grebe	Black-crowned Night-Heron	Common Tern
Sora	Virginia Rail	Eared Grebe	Green Heron	Ring-billed Gull
American Coot	Sora	Western Grebe	Little Blue Heron	Herring Gull
Common Moorhen	Black Tern	Pied-billed Grebe	Yellow-crowned Night-Heron	Great Black-backed Gull
American Bittern	Forster's Tern	Green Heron	Great Egret	Least Tern
Least Bittern	Common Moorhen	Little Blue Heron	Cattle Egret	Little Gull
Sandhill Crane	American Coot	Great Blue Heron	Snowy Egret	Canada Goose
Green Heron	Pied-billed Grebe	Black-crowned Night-heron	Canada Goose	Mallard
Little Blue Heron	Great Blue Heron	Yellow-crowned Night Heron	Common Goldeneye	Piping Plover
Yellow-crowned Night-Heron	Black-crowned Night-heron	Cattle Egret	Wood Duck	Killdeer
Great Blue Heron	Cattle Egret	Snowy Egret	American Black Duck	Spotted Sandpiper
Black-crowned Night-heron	Great Egret	Herring Gull	Green winged Teal	
Cattle Egret	Green Heron	Canada Goose	Hooded Merganser	
Canada Goose	Little Blue Heron	Mute Swan	Mallard	
Northern Pintail	Yellow-crowned Night Heron	Trumpeter Swan	Common Merganser	
Mallard	Black-crowned Night-heron	American Black Duck	Red-breasted Merganser	
Gadwall	Herring Gull	Northern Shoveler	American Woodcock	
Ring-necked Duck	Little Gull	Ring-necked Duck		
Blue-winged Teal	Mute Swan	Mallard		
American Black Duck	Trumpeter Swan	Green-winged Teal		

SEASONAL WETLANDS AND WET MEADOWS (OPEN HERBACEOUS AND MUDFLAT SETTINGS)	**SHALLOW SEMI-PERMANENT MARSHES, HEMI-MARSH (EMERGENT VEGETATION AND OPEN WATER MIX ~ 50:50)**	**DEEP-WATER MARSHES AND OPEN WATER, ISLANDS WITH HERBACEOUS OR BRUSH VEGETATION**	**HERBACEOUS WETLANDS WITH ASSOCIATED FOREST / FORESTED ISLANDS, RIPARIAN AREAS**	**UNVEGETATED ISLANDS WITH ASSOCIATED OPEN WATER**
Common Snipe	Northern Pintail	Redhead		
Killdeer	Blue-winged Teal	Ruddy Duck		
Wilson's Phalarope	Ruddy Duck	Canvasback		
Marbled Godwit	Redhead	Lesser Scaup		
American Avocet	Canada Goose	Common Merganser		
Black-necked Stilt	Mallard	Red-breasted Merganser		
Spotted Sandpiper	Gadwall	Spotted Sandpiper		
	Northern Shoveler			
	Ring-necked Duck			
	Lesser Scaup			
	Canvasback			
	Wilson's Phalarope			
	American Avocet			

Figure 5.1. Distribution of colonial waterbird nesting sites in the Great Lakes region, 1977-1999.